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Editorial Comment

Safeguard Our
National
Leaders

Never more in our history than now have we needed vigorous leadership in our National Capitol. Never has there been a greater strain on our Senators and Representatives. Is it fair to send them from healthy areas of the United States, accompanied by their families, to Washington and allow that City to remain so heavily infected with tuberculosis that it constitutes a menace not only to every legislator and his wife, but especially to his children under thirty years of age?

Next to our President, our legislators are our Heroes. We have a right to demand that they and their families, especially their children, be given every possible health protection. Yet, in Washington, D. C., tuberculosis is rampant—568 known deaths from that disease in 1939, a death rate of 87.4 per 100,000. That means that thousands of people, sick with tuberculosis in an infectious stage, are going about in the District of Columbia, expectorating into the grass of the beautiful parks where the little children of our legislators play. The little baby's hand goes down into the cool green grass and comes up gummy with millions of tuberculosis germs to go into that rosy little mouth. Need we

carry the picture farther? Tuberculosis waiters and cooks are feeding our Heroes, tuberculous nurse maids are in their homes, tuberculous clerks are handing them infected papers, infected stenographers are coughing at their side. You may think it is a cigarette cough, but look at the lung x-ray! See that eaten out tuberculous hole!

What is to be done about it? Certainly, loosen up on Uncle Sam's purse strings.

The noble men who are charged with guarding that purse, the Members of the Senate and House Appropriations Committees are not doctors. They are constantly besieged by well meaning and influential people who want money spent for this and that. They have to be able to say, "No". But, we feel certain that if this horrible matter is presented to them in its true light, they will back to a man the necessary expenditure of funds to find all cases of active tuberculosis in Washington and segregate them so that our legislators and their ladies and little children may be safe.

Remember this, tuberculosis only exists to this extent because enough money is not being spent *every* year to x-ray teachers, cooks, school janitors and other school em-

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The Indications for Voluntarily Discontinuing Artificial Pneumothorax Treatment*

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When to stop pneumothorax treatment—this is often a difficult problem. It depends upon so many factors: the extent and the type of the tuberculosis, the mechanics of the collapse, its effect and the duration of its effect on the toxic symptoms of the disease, the occurrence of exacerbation of the disease or of complications arising during the treatment, and many personal factors, social, economic and psychic, in the individual patient. Then the problem is intertwined with the psychological reaction of the physician to the disease—whether he is likely to employ offensive or defensive strategy, how long a time he thinks is required for the disease to reach an anatomical cure. Finally, the reaction of the patient to stopping the collapse treatment must be considered.

It is necessary to define certain terms, such as:

a) *Minimal lesion*, which is a slight infiltration, without demonstrable cavitation, usually lying above the second rib.

b) *Moderately advanced lesion*, which is a more severe infiltration involving no more than one-third of the volume of a lung and with a cavity, if present, of no more than 4 cm. in diameter.

c) *Far-advanced lesion*, which is more extensive than moderately advanced disease. The total diameters of cavities, usually present, exceed 4 cm.

Therapeutic Pneumothorax

1) This is a *failure* when no pleural space can be found.

2) It is *non-effective* when a pocket, usually at the base, can be formed, but it has no effect on the lesion or on the symptoms.

3) It is *partially effective* when a fairly good collapse can be obtained and results in definite symptomatic improvement; but because of adhesions, closure of the cavity is not accomplished.

4) Finally, therapeutic pneumothorax is *effective*, or satisfactory, when the cavity can be collapsed, the lesion brought under control and the sputum freed of tubercle bacilli, unless the bacilli have their source in a lesion in the bronchi, or in the opposite lung. In occasional cases, a year may elapse before the collapse becomes satisfactory. The effectiveness of the collapse is dated from the time that the objectives mentioned above have been attained.

In general, minimal disease requires one year of effective pneumothorax; moderately advanced disease, two to three years; and far-advanced disease, four or five years to obtain healing.

Non-effective Collapse—Usually, its uselessness is realized within a few weeks. In rare instances, a pneumothorax at the base, which appears to be a failure mechanically, may become completely successful. In all probability this results from depressing the diaphragm and stopping its motion. I have seen two such cases. As a rule, however, an ineffective collapse is given up at once.

Partially Effective Pneumothorax—This requires a longer period of study before voluntarily abandoning the treatment. The apex may be widely adherent to the cupola, or broad dense bands may extend to the chest wall from the partially collapsed cavity-bearing-area. One tries internal pneumonolysis, or external pneumonolysis, a temporary phrenic nerve interruption, increased gas pressure and our great ally—time. As mentioned above, some cavities lying in dense infiltration are slow to close. Usually, the other lung is involved; sometimes it is involved extensively and no other form of more major collapse may be available. Good clinical judgment based on long experience is often required to decide what to do for these patients who have been much improved by the pneumothorax and whose cardiorespiratory reserve would permit one to consider thoracoplasty as a substitute for the pneumothorax. One sometimes has to consider vol-

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untarily stopping the first pneumothorax and instituting pneumothorax on the opposite side, as a preparation for a later thoracoplasty on the original side. I have sometimes been very glad that I was not hastened into an early decision to abandon such a pneumothorax. As long as the cavity is slowly closing, the disease in the opposite lung healing, the symptoms, especially cough and expectoration, improving and, if the mechanical difficulties do not appear to be insurmountable, it is well to give the pneumothorax a chance to become successful. At the same time, one must be guided by the knowledge that cavities which close slowly sometimes reopen after reexpansion, especially when much of the upper third of the lung has been diffusely adherent to the chest wall and mediastinum. In general, then, partially effective collapse by pneumothorax should be abandoned for some other form of collapse therapy, if feasible. This should be done as early as possible or, to place a time limit, within several months. Some exceptions, however, must be admitted.

Bilateral Pneumothorax—The minimal time limits mentioned earlier for the various stages of disease apply particularly to unilateral pneumothorax. With bilateral pneumothorax, I am inclined to shorten the minimal period, although bilaterally selective pneumothorax of three to five years duration is no great load on the cardio-respiratory functions. Most of these patients have exudative, relatively fresh disease, usually with less extensive disease on one side, and one likes to decrease, as early as possible, the chances of developing complications by abandoning the pneumothorax on that side at the earliest conservative moment.

Character of the Collapse—The best pneumothorax is one which is made effective quickly and, especially, one which is mainly over the area of principal disease—selective pneumothorax. This can be abandoned earlier than one which is mechanically less effective or more slowly made so. Hjaltestad and Torning studied their cases from the point of view of the mechanics of the collapse, i.e., whether the lung was free or could be freed, or whether band or diffuse adhesions were present over the upper third of the lung. Even when the cavity closed and the sputum became free of tubercle bacilli, too many

who did not have an ideal collapse relapsed after reexpansion. In some of the cases, therefore, with an effective collapse, as defined above, one should assume the difficult decision of abandoning the pneumothorax and employing thoracoplasty. Such patients will generally have had old disease and a large cavity or several cavities in the apex, which is diffusely attached to the cupola. In another type of case, one may have a 90 per cent collapse without closure of the cavity. It is almost impossible to obtain such a complete collapse by the most extensive thoracoplasty. One has to decide between maintaining the collapse in the hope that the cavity will close eventually, while accepting the possibility of empyema developing, or substituting a thoracoplasty which will probably not afford such an extensive collapse, but will offer less complications once the postoperative period has been passed.

Complications—Repeated pleural shock may force a voluntary abandonment of the pneumothorax. Bronchopleural fistula is nearly always the signal for as early a thoracoplasty as possible. Pleuracutaneous fistula is rarely a cause for stopping the treatment. The onset of tuberculous empyema without bronchopleural fistula presents the problem of whether or not to abandon the collapse. Some surgeons would advise thoracoplasty in most of these cases. If the pulmonary disease is under control, if the empyema is "cold," or only slightly toxic, if bronchopleural fistula has been proved to be absent by gas analyses and by injection of dye into the pleural cavity, I find it preferable to try repeated pleural lavage. When the lung is so thoroughly collapsed that one could not expect to have the chest wall, after thoracoplasty, fall in to meet the lung, i.e., if after thoracoplasty a pleural pocket containing pus might be expected to persist, I prefer oleothorax as a substitute for pneumothorax. When, however, the tuberculous empyema occurs without an effective collapse of the lung, and when it is due to a bronchopleural fistula, thoracoplasty should be substituted for the pneumothorax as early as possible. When the empyema is acute, with rapidly forming purulent exudate (as is so common when bronchopleural fistula is present, but cannot be proved), thoracotomy and later thoracoplasty are indicated as soon as it is

evident that aspirations and lavage are unavailing.

Oleothorax—In addition to being indicated in certain cases of tuberculous empyema, oleothorax is a substitute for pneumothorax in certain cases in which the lung, while remaining effectively collapsed at the diseased area, is expanding prematurely from the base upward—obliterative pleuritis. Some of these cases of apical oleothorax may have to be maintained permanently.

Opposite Lung—Since about two thirds of cases of pulmonary tuberculosis are diagnosed

in an advanced stage, it is natural to find that the lung on the side opposite to the pneumothorax is frequently diseased. In a series of pneumothorax patients of the late Dr. Lawrason Brown and myself, the uncollapsed lung was normal, or practically so, in 29.9 per cent; its disease was moderately advanced in 49.1 per cent; and far-advanced, usually with cavity formation, in 20.9 per cent. The following table shows that the effectiveness of collapse has a great influence upon the behaviour of the disease on the contralateral side.

Table I.—The Degree of Cavity Collapse and Its Effect Upon the Condition of the Functioning Lung

Collapsed lung	Functioning Lung								
	Practically normal			Moderately advanced			Far-advanced		
	Number of cases	Worse after A.P., per cent	Same or Better after A.P., per cent	Number of cases	Worse after A.P., per cent	Same or Better after A.P., per cent	Number of cases	Worse after A.P., per cent	Same or Better after A.P., per cent
Cavity closed by A. P.	69	7.2	92.8	83	15.6	84.4	16	31.2	68.8
Cavity partly closed	26	50.0	50.0	64	40.6	59.4	36	75.0	25.0
No collapse of cavity	22	68.1	31.9	45	55.5	44.5	30	83.3	16.7

The table shows clearly that, even with effective collapse (cavity closed), the extent of disease in the uncollapsed lung exerts a definite influence on the fate of the patient; the disease in the uncollapsed lung became worse twice as often when it was in an advanced stage as when it was in a moderate stage. When the disease progresses in the better lung, the question of whether or not to stop pneumothorax treatment arises. This is a matter of judgment. If the contralateral disease is slight, or occurs early in the course of pneumothorax, it nearly always heals if the collapse can be made effective. If the new disease progresses one has to decide between stopping the pneumothorax or making it bilateral. If both lungs are originally extensively involved and if the con-

tralateral disease is slowly progressive, one usually has to reexpand the lung on the pneumothorax side.

Extent of Disease—Taken by itself, the extent of involvement of the lung before collapse is not as important in a consideration of the duration of collapse, as is the character of the lesion. In general, the more advanced the disease, the longer the collapse should be maintained.

Age of Disease—The same idea prevails here—the older the disease, the longer it requires to heal and the greater the duration of collapse required. In other words, fresh disease is usually relatively exudative, or "soft"; under collapse it tends to absorb at a relatively rapid rate when the patient's resistance is good, as compared with the slow

healing of older and more fibrous disease.

Type of Disease—The moderately advanced and advanced lesions, which are found to be healed after six months to two years of collapse treatment, are practically all of an exudative or mixed exudative—proliferative nature. Such rapid healing is always a pleasant surprise when the lung reexpands involuntarily, but it should not be relied upon too much. Veran, whose series contained a good number of such early exudative cases, blamed his relatively high percentage of reactivations on too early reexpansion. It is well known, however, that the cavity in this type of disease is usually soft walled and easily and quickly collapsed. We have already noted that the sooner the collapse can be made effective, the earlier the lung may be allowed to reexpand. Fibrous, thick walled cavities collapse slowly and heal slowly. If they are tugged upon by adhesions, they may not seal off after five years of collapse, even though the walls have been in contact during all that time. When a lung containing tuberculous pneumonia is collapsed, cavities tend to enlarge at first and even new ones develop. These cases require very prolonged collapse. Some of them, with the whole lung destroyed, should never be allowed to reexpand. The pneumothorax may be maintained permanently, or thoracoplasty may be indicated after several years of pneumothorax.

Size of the Cavity—The larger the cavity, the longer the collapse should be maintained after closure of the cavity. This problem also is closely related to the character of the disease. If one is so fortunate as to close a giant cavity, the collapse should be maintained permanently, either by pneumothorax or by thoracoplasty.

Serous Pleural Effusion—The development of a serous effusion is not a reason for voluntarily stopping pneumothorax. When the fluid remains serous for a long time, repeatedly developing and requiring aspirations, an effective pneumothorax should be maintained as long as seems necessary. Prolonged serous effusion leads to an obliterative pleurisy in about 20 per cent of cases. The expansion is then an involuntary matter. In an almost equal number (18.7%) of my cases, the collapse was improved and the patient was better off after a serous effusion.

Social, Economic, Personal Factors—As a

rule, it seems wiser to maintain pneumothorax longer in a manual worker than in a clerk who leads a sedentary life. The same general advice applies to a poor patient, who is unable to enjoy health-preserving vacations from his work, as compared with a patient who has good financial resources. I am not sure that pneumothorax is a safeguard for some careless ill-disciplined patients, but when such a one has an effective collapse, it seems wise to prolong the treatment for a good conservative period. When a woman about to be married has a successful pneumothorax, even though the lung may be healed, it is advisable to maintain the collapse during the first pregnancy. If the pneumothorax is about to be abandoned voluntarily in a woman who then becomes pregnant, continuance of the pneumothorax is usually counseled until the baby is several months old.

Inexpansible Lung—Sometimes the lung will not expand when voluntary cessation of pneumothorax is attempted. This is usually due to bronchial stenosis, a sequel of bronchial tuberculosis. The inability to re-expand may also be due to fibrous thickening of the visceral pleura as a result of empyema or oleothorax. If one stops giving refills, the mediastinum draws over to the collapsed side and fluid usually fills the remaining space. A markedly deviated heart with torsion on the vessels sometimes leads to circulatory embarrassment. Serous effusion remaining a long time in the pleural cavity occasionally becomes purulent. To avoid these complications in the case of an inexpansible lung, the operator must choose between permanent pneumothorax; oleothorax (if the pleural space is not too large); thoracoplasty, if the lung is not so far removed from the chest wall that a complete removal of ribs can be expected to make the lung and chest wall meet; or to stop giving refills, take a chance on the possible complications and hope the opposite lung will enlarge to fill the increased volume of the contralateral pleural space, as the mediastinum retracts to the collapsed side. It is apparent, therefore, that indications for permanent collapse sometimes arise and in some cases permanent pneumothorax is the best choice.

Clinical Indications for Voluntary Reexpansion—When the lung has been effec-

tively collapsed for a period of one year in minimal disease, three years in moderately advanced disease and four or five years in far-advanced disease, the problem of discontinuing the collapse arises. One reviews the films and the course of the disease previous to pneumothorax to determine whether to give the minimum or the maximum period of collapse. Various factors will influence the decision: the presence of an active complication, such as intestinal or laryngeal tuberculosis; the present general condition of the patient; whether pleural or pulmonary complications have arisen during the treatment; one's estimation of the resistance of the patient to the disease; the original size of the cavity; and the extent of the disease. In a case favorable for reexpansion, the series of

sedimentation rates, the leukocytic count and ratio, and the proportion of immature cells will have been normal for some time. The phase of reexpansion is then begun. If tubercle bacilli are found later in the sputum, or if the cavity reopens, one may recollapse with pneumothorax if the collapse has been maintained for a minimal period; if for a maximal period, thoracoplasty is advisable if possible, because if the cavity had not healed after three or five years of compression it probably would not heal after several more years. If during reexpansion slight symptoms reappear, such as low grade fever and purulent expectoration, the reexpansion should be halted and the collapse maintained longer.

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The Surgical Treatment of Acute Pulmonary Abscess*

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The present day methods of treating acute pulmonary abscess can be epitomized by stating that they are basically conservative, the assumption being that the disease is not surgical in its acute phase. There are as yet relatively few who do not adhere to this viewpoint. Hence, surgical treatment is usually employed only for serious or urgent complications, or at times when bronchoscopic management, postural drainage, or treatment by drugs and by bed rest fail. To advance the concept of acute pulmonary abscess as a surgical disease requires not only sound argument but, also, good results following operation.

The reasons which have been advanced against surgery in the acute stage of pulmonary abscess, require consideration. They consist, on the one hand, of experiences with spontaneous cure and, on the other hand, of the assumption that a pulmonary abscess is largely a pneumonic lesion in the acute stage. It is, therefore, necessary to discuss not only the subject of spontaneous cure,

but also the pathology of acute abscess.

The occurrence of spontaneous cure or of cure under conservative treatment of acute abscess is well known, but the reported incidence of cures ranges from about 10 per cent all the way up to 90 per cent. The reason for the discrepancy is not obvious. There are two possibilities which come to mind. One is a difference in follow-up and the other is a difference in the criteria by which cures are judged. With strict criteria of cure, consisting of freedom from symptoms and disappearance of cavity and pulmonary infiltration, and with careful and complete follow-up, the percentage of cures under conservative treatment is low. The argument of a high proportion of actual cures of acute pulmonary abscess by the use of various non-operative measures cannot be justifiably advanced.

The assumption that widespread pneumonic infiltration, occupying more or less ill-defined pulmonary zones, characterizes the pathology of acute abscess of the lung, is usually based on the interpretation of roentgenograms, or of operative findings and is not a fact. Of course, there are exceptions, for example,

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instances in which a lung is virtually drowned by the aspiration of large quantities of infective material, or in some forms of *aerobic* pulmonary abscess, to which reference will be made.

Some of the facts concerning the pathology of acute pulmonary abscess must be presented since my advocacy of surgical treatment is based on the pathology of the lesion. Acute abscess of the lung may be divided into the common putrid or anaerobic variety and the less common non-putrid or aerobic form. The reason for the separation of the two rests on the difference in pathology and the consequent difference in treatment. As described in other communications,^{1,2,3} an acute putrid abscess of the lung (of less than six weeks' duration) is a solitary monolocular lesion situated superficially within a pulmonary lobe. The overlying shell of lung is thin and soft, compressed, and is essentially avascular. There are always localized adhesions over the abscess, and these agglutinate the surface of the lung over the abscess to adjacent structures. The latter usually are the thoracic parietes, so that adhesions over the abscess can generally be referred to as agglutinating visceroparietal adhesions. Occasionally, however, because of the situation of abscesses, the adhesions may extend from the surface of the abscess to an adjacent pulmonary lobe, to the mediastinum, or to the diaphragm. Two other features of acute putrid pulmonary abscess are worthy of note, namely the limited extent of pneumonia about the abscess in most instances, and the similarly limited changes in the bronchial tree except in the area of the abscess. Perhaps it is not amiss to mention, by way of contrast, that a chronic putrid abscess is characterized by stiff walls, multilocularity, extensive pulmonary infiltration and fibrosis, and pronounced changes in the bronchial tree. Obviously, the difference in the pathology of acute and chronic putrid abscess may be the measure of the difference in results which logically can be anticipated after drainage operation in acute, as compared with chronic, lesions.

The pathology of acute *aerobic* or *non-putrid* pulmonary abscess is much more variable than that of acute putrid abscess.⁴ The lesions may be multiple. The pulmonary abscess may be in the midst of an extensive area

of bronchopneumonia, and may be only an incidental feature of the whole lesion. Furthermore, an extensive bronchopneumonia may be present even when the pulmonary abscess is a prominent part of the lesion. Indeed, the typical picture of a putrid pulmonary abscess with its limited and narrow zone of pulmonary infiltration is rarely seen. For these reasons, the indications for operative treatment should be different in the two conditions. However, some of the features of putrid pulmonary abscess are seen in aerobic abscess. Thus, the abscess usually is of substantial proportions, and is usually unilocular. It is situated superficially within a pulmonary lobe, and there are visceroparietal agglutinating adhesions. Since recovery under conservative treatment often occurs, perhaps reports of high incidence of cure of acute pulmonary abscess under conservative treatment may be based in part on the inclusion of cases of aerobic pulmonary abscess with cases of anaerobic or putrid pulmonary abscess.

From the foregoing, it may be said that practically all cases of *putrid* pulmonary abscess can be regarded from the viewpoint of pathology as amenable to surgical treatment in the acute stage, but only exceptional cases of *non-putrid* or *aerobic* pulmonary abscess can be so regarded. Concerning the incidence of cure without operation, the following quotation⁵ appears appropriate: "The frequent occurrence of subacute and chronic abscess offers incontrovertible evidence that, in the acute stage, cures following conservative treatment are not as common as often has been reported. If the subacute and chronic cases which come under observation really represent only a small proportion of the total number of cases of pulmonary abscess, the preponderance of cases having subsided in the acute phase under conservative therapy, then abscess of the lung must be a far more common disease than hitherto has been suspected."

The seriousness of acute putrid pulmonary abscess can be appreciated only if the sequelae of delay and the complications with their mortality are kept in mind. The mortality attendant on conservative treatment of the primary lesion is low and should be regarded as a less potent argument against indiscriminate conservative treatment than the inherent dangers from complications.

There surely is no logical reason for setting an arbitrary time (often set at six weeks or longer) which must elapse before surgical treatment can be considered or instituted.

If the pathology of acute putrid abscess, as described above, is conceded, and the uncertainties and dangers of indiscriminate conservative treatment are recognized, the requirement of a sound argument, referred to at the outset, for the concept of acute pulmonary abscess as a surgical disease is met. The second requirement, however, must also be met, namely a satisfactory outcome of operation. It should be stated at once that the term "surgical disease" does not imply the application of operation to all cases, or the exclusion of other forms of treatment. Thus, the disease can be regarded as primarily surgical even if some cases of pulmonary abscess progress satisfactorily and go on to spontaneous cure or cure by conservative measures. To meet the second requirement of good results in acute abscess by means of surgery, the goal must be cure and not improvement, for improvement occurs not infrequently under conservative management. Good results by surgery also implies low mortality. Further consideration of the subject can be taken up under the heads of: (1) indications for operation, (2) requirements for a satisfactory operation, (3) operative procedure, (4) postoperative management, (5) results of operation.

Indications for operation in acute putrid abscess of the lung broaden inevitably in this, as in other surgical diseases, as more and more satisfactory results are achieved. Thus, I operated originally only on cases with severe clinical course and rapidly progressive pulmonary excavation, with or without perforation into the pleura. As good results were encountered in such cases, the indications were extended to less fulminating or hyperacute cases. This was a gradual development, for I had to bear in mind the fact that surgical treatment is not logical, if the morbidity and mortality of operation are higher than in non-operative treatment. At the present time, the operative indications can be classified as imperative and elective. There will, of course, be less difference of opinion concerning the former than the latter. Indeed, there is always a difference of view concerning elective indications and one may

assume that some of the cases which have been subjected to operation in recent years might have recovered spontaneously. However, the same statement can be made for other acute surgical diseases, appendicitis for example. An imperative indication clearly exists in all cases of hyperacute abscess, that is, in cases in which the clinical course is fulminating, regardless of the size of the pulmonary abscess or the prostration of the patient. Perforation of an abscess into the pleura also comprises an imperative indication. The elective indications at the present time may be listed as follows: (1) no evidence of subsidence during observation; (2) an unsatisfactory clinical course; (3) a pulmonary abscess more than two inches in diameter; (4) roentgenographic evidence of extensive pleural reaction, suggesting imminent perforation of the pulmonary abscess; (5) clinical, roentgenographic, or bronchoscopic evidence of interference with adequate bronchial drainage; (6) fluctuating, remitting, or essentially stationary course; (7) increase in the size of the abscess during the period of observation; (8) potentially dangerous situation of the lesion, as in the cardiac lobe or at the mediastinum.

A well conceived *operation* should be based first on the recognition of the pathology of acute abscess as a solitary abscess superficially situated within a pulmonary lobe and with overlying pleural adhesions, and secondly, on the precise roentgenological localization of the site of contact between the abscess and the thoracic parietes. Leaving aside those exceptional instances in which a putrid pulmonary abscess faces an interlobar fissure, the diaphragm, or the mediastinum (already referred to), the exact area of contact between abscess and chest wall (which is the area of pleural adhesions) can and must be determined roentgenologically, if the type of operation to which I shall refer shortly is to be carried out. The lesion must be encountered at operation at the correct site. Judging from personal experiences, errors in localization can only be referred to incorrect roentgenological interpretation of the site of contact between the abscess and the thoracic cage, or to incorrect counting of ribs at the time of operation. The precise localization of pulmonary abscesses has been aided greatly by the method of spot localization devised

by Rabin.* This important method consists essentially of the injection into the musculature of one intercostal space, shortly before operation, of a small amount of admixed lipiodol and methylene blue at the predetermined site of contact of the abscess with the chest wall, followed by a series of films taken in appropriate positions. The relationship between the lipiodol and the abscess will be revealed and the methylene blue in the intercostal space will be the guide to the correct rib to be removed at operation. The surgical approach to the abscess will be at, or measurably away from, the site of the lipiodol-methylene blue injection in accordance with the relationship in the films of the radio-opaque substance to the pulmonary abscess. This new method is stressed because of the great assistance it has rendered to the precise surgical approach to the pulmonary abscess—the essence of correct operative treatment.

The operative plan to be advocated consists essentially of a one stage procedure in which the abscess is entered through overlying pleural adhesions, unroofed, and packed. As has been emphasized, such an operative procedure is predicated on the precise localization of the lesion and this implies close cooperation with the internist and the roentgenologist. Without precise preoperative localization, a one stage operation should be regarded as haphazard and dangerous. A brief recital of some of the *principles of operation* may not be amiss.

Local anesthesia is the method of choice. The removal of a portion of one rib suffices for adequate exposure, in the majority of instances, if the lesion has been localized accurately; too liberal rib excision may expose uninvolved pleura and thereby invite its accidental entry. Since the adhesions over the abscess are both dense and extensive in the great majority of cases, entry of the abscess through pleural adhesions without entry of the free pleural space is to be achieved in most instances. With the exceptions that have been noted (abscesses facing fissures, diaphragm, or mediastinum), the operative exposure of scanty or limited or absent adhesions indicates that the abscess is not presenting in the operative field. The abscess

is always to be entered where it is superficially situated. Thus, only a thin avascular shell of lung is to be traversed. That portion of the shell which overlays the abscess is liberally removed, the free contents of the abscess are removed, and the interior examined visually for recesses. The operation is completed by packing the cavity with gauze. Emphasis should be placed on the fact that the size and shape of the abscess unroofed at operation should approximate its size and shape in the preoperative film. Since most putrid pulmonary abscesses which are operated upon are of substantial proportions, the assumption that an abscess has been adequately cared for when only a small collection of foul pus and a correspondingly small cavity is disclosed, is likely to be incorrect. An inadequate operation is often followed by the continuation of symptoms of acute pulmonary abscess, extension of the lesion, and spillover, whereas an adequate operation almost always is followed promptly by the subsidence of the manifestations of pulmonary abscess.

In some early experiences, two stage operations were performed when the free pleura was opened accidentally or intentionally. After a few disastrous experiences, the one stage operation has been the only method employed in the great majority of instances regardless of whether or not the free pleural cavity is traversed. The technical procedures employed to prevent the occurrence of post-operative empyema have been described elsewhere.⁶ That they have been satisfactory is proven by the fact that empyema occurred in only one of some fifteen cases in which the free pleura was entered during a one stage operation. The recognition and correct management of an entry, no matter how small, into the free pleura, are vital to the recovery of the patient, if a one stage operation is to be performed. In general, it can be said that the more precise the preoperative localization, the less often will the free pleural space be traversed at operation. In any event, the entry of the free pleura should not be distant from substantial visceroparietal adhesions. Such adhesions are scanty or absent only in the exceptional instances to which reference has already been made (abscesses at interlobar fissure, diaphragm, or mediastinum). The principle of operation in these rare cases involves frank entry and

* To be published.

sealing off of the free pleura in a one or two stage operation, and the entry of the abscess in the same manner as the usual abscess, namely at its superficial surface.

The *management* of cases after an adequate operation has been performed is usually simple, but it may be both difficult and unsuccessful after inadequate operation. After an unsatisfactory operation, there may arise the problem of complicating pleural infections, secondary pulmonary abscesses, pulmonary abscesses due to spillover infection, diffuse pulmonary infections, etc. These complications will be rarely encountered if the principles which have been outlined are followed. Recovery after operation cannot, of course, be anticipated in every case, if many severe cases are operated upon, regardless of an adequate operation. Thus, in one fatal case, expectoration of foul pus ceased promptly after operation, but chills and fever, which had dominated the preoperative picture, continued unabated. Usually, however, the influence of an adequate operation upon the general and special symptoms of acute putrid abscess of the lung are prompt and striking, complications are few and rarely serious, and convalescence is uneventful. Foul odor from the wound is very exceptional, and usually the sole local problem in the wound is the prevention of premature closure of bronchial fistulae in the wall of the pulmonary cavity.

Before presenting the results of operation for acute putrid pulmonary abscess, the *surgical aspects of acute aerobic abscess* warrant some consideration. The disease is no longer rare because the variety of bronchopneumonia of which it is a complication is now frequently encountered. Of the types which are seen, only the solitary and segmental form of aerobic pulmonary abscess may be of surgical significance. I have already referred to three varieties of the solitary lesion: (1) the abscess as an incidental part of an extensive bronchopneumonic lesion; (2) the abscess as a prominent lesion situated in the midst of a large area of bronchopneumonia; (3) the abscess surrounded by a more or less sharply limited and narrow zone of infiltrated lung. The differentiation between these three varieties must be based largely on roentgenographic features. Spontaneous recovery or recovery by drug therapy may occur in all three varieties; the disease may also

pursue a fatal course. I have operated upon all three varieties, but the results have been unsatisfactory in the first two forms. In my opinion, it is only the third variety which should be regarded at times as a surgical lesion. Even here, recovery without operation often occurs. The chief danger in deferring operation would appear to be perforation into the pleura. Obviously, a much more conservative attitude as to operative indication should be assumed in aerobic pulmonary abscess than in putrid pulmonary abscess. The fact that in personal experiences a few cases of typical acute abscess were subjected to operation and were cured does not establish the lesion as a surgical disease. Many more experiences will be required. It can, however, be stated at the present time that, since the pathology of typical aerobic abscess is similar to that of putrid pulmonary abscess, the lesion can be properly regarded as one which lends itself readily to operative treatment. In the cases upon which I have operated, one stage procedures, based on precise preoperative localization, were performed.

Turning now to the results of operation for acute putrid pulmonary abscess, the statements I wish to make are based on a study of 109 consecutive cases that have been operated upon by Dr. Touroff or myself in the past fifteen years. This series, complete up to date, has not as yet been reported upon. Whereas operations were the exception rather than the rule in earlier experiences, in recent years operation has been performed in the majority of cases that have come under observation. In no instance has operation been withheld because of the severity of the disease. There were four deaths following operation for acute putrid abscess, a mortality of 3.6 per cent. There were several additional deaths which occurred months or years after operation at a time when the pulmonary abscess had healed. (These deaths, due to unrelated causes, such as carcinoma of the stomach or actinomycosis, are mentioned for purposes of completeness.) Of the 109 cases, about one-third were of the severe or hyperacute variety. It is of interest to note that of the four deaths, three occurred among this hyperacute group. The fourth death took place a number of years ago, after a two stage operation, and would probably not occur today. In other words, the evidence

indicates clearly that the mortality, if any, of the surgical treatment of acute putrid abscess of the lung should be confined essentially to fulminating or hyperacute cases, that is cases in which the operative indication is imperative to save life. Thus elective operations for acute pulmonary abscess should come to be regarded as safe procedures.

The immediate and end results of operation for acute putrid pulmonary abscess can be stated briefly. A single operation sufficed to achieve cure in the great majority of cases. There were a few instances in which secondary pulmonary abscesses required drainage mainly because the primary operative procedure was inadequate. Postoperative empyema occurred in three cases. Later operations related to the acute abscess consisted in revision of wounds because of premature closure in two cases, and the transplantation of fat for the closure of open bronchopulmonary cavities in four cases. Thus, secondary and revisional operations were required in relatively few instances. The term "improvement" employed after operations for acute putrid pulmonary abscess, should be applicable only to the early postoperative state in which patients are doing well and are progressing definitely towards cure. It should have no other place in the surgery of acute abscess because the only end result which should be sought for and achieved is cure.

The term "cure" denotes a healed wound, complete freedom from symptoms, the disappearance of roentgenographic evidence of pulmonary infiltration referable to pulmonary abscess, and negative bronchoscopy in cases in which bronchoscopic check-up is employed. These are strict criteria and yet by these criteria the vast majority of 105 patients are found to be cured in a period of follow-up which has extended over fifteen years.

Thus, there is warranted the general acceptance of acute putrid pulmonary abscess as a surgical disease in which logically conceived operative indications, followed by precisely performed operative procedures, yield excellent results with low mortality. Undoubtedly, the results of operation will prove as satisfactory in the experience of others if the principles which have been set forth are observed. As indicated at the outset, the concept which has been advanced of acute pulmonary abscess as a surgical disease, differs from that which is still widely held by both physicians and surgeons. I hope that it will appeal to you because all who have had much experience with the disease are undoubtedly aware of the dangers and uncertainties of the acute phase and the oftentimes difficult problems rendered by the disease in its more chronic stages. The menace of subacute and chronic pulmonary abscess will disappear only when the problem is squarely faced and adequately solved in the acute phase.

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ELECTIONS

Dr. Fred Meixner, Peoria, Illinois, Regent of the College, was elected Vice-President of the Illinois Tuberculosis Association at its last annual meeting.

Also, at the annual meeting of the Peoria Medical Society in January, Dr. Meixner was appointed Chairman of its Tuberculosis Control Committee and the following members of the Society were named to serve with him: Dr. Maxim Pollack and Dr. D. F. Loewen, both of Peoria.

TEXAS STATE TUBERCULOSIS COMMITTEE

The following physicians comprise the Tuberculosis Committee of the Texas State Medical Society: Dr. R. B. Homan, El Paso, *Chairman*; Dr. W. D. Anderson, San Angelo, Dr. H. Frank Carman, Dallas, Dr. Chas. J. Koerth, San Antonio, and Dr. F. S. Littlejohn, Marshall. With the exception of Dr. Littlejohn, all of the members of the committee are Fellows of the American College of Chest Physicians.

Extrapleural Pneumothorax: A Report of Experiences and Present Day Indications

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At the time of revival of extrapleural pneumothorax in the treatment of pulmonary tuberculosis, it was hoped that the operation would solve the therapeutic problem of many patients urgently needing collapse therapy in whom the establishment of intrapleural pneumothorax was impossible. It has been emphasized by all writers that the procedure necessary to carry out extrapleural pneumothorax entailed less operative shock and, therefore, carried a lower operative mortality than thoracoplasty. It has been pointed out that the immediate objective, cavity closure, could be reached without subjecting the patient to multiple stage operations. It was also hoped that re-expansion could be effected later, if a temporary form of collapse were desired.

With such a picture painted for extrapleural pneumothorax, one could visualize a useful place for it on either extremity of the position held by thoracoplasty. On the one hand, extrapleural pneumothorax could be considered for those cases with insufficient disease to justify thoracoplasty, i.e., a substitution for intrapleural pneumothorax in the event of adherent pleura. On the other hand, extrapleural pneumothorax could be considered in an attempt to salvage certain patients with far-advanced disease when thoracoplasty was contra-indicated by age, too extensive distribution of disease, too ill a patient, or severe complications.

However, at the present time, six years after the revival of extrapleural pneumothorax by Graff¹ and Schmidt,² its value is still seriously questioned. Indications have been difficult to define and reports on end results are conflicting. Proctor³ and Dolley, Jones and Skillen⁴ contend that many cases considered to be unsuitable for thoracoplasty can be successfully managed by extrapleural pneumothorax with early conversion to oleothorax. Churchill⁵ has warned, however, that the procedure is too dangerous to use in treating unstable disease, or in preparing a patient for thoracoplasty, if there is a reasonable chance that this end can be accom-

plished otherwise. Davidson and Fink⁶ reported a high percentage of failures and found complications the rule rather than the exception. They felt that the use of extrapleural pneumothorax should be greatly restricted.

The purpose of this paper is to give a late report on a group of patients treated from one to two and one-half years previously, to present indications used then and now, and finally to point out what is considered a better disposition of certain cases formerly accepted for extrapleural pneumothorax. Matters of surgical technique and after-care will not be discussed. No significant alterations have been made in the technique described in a preliminary report by Tubbs and the author.⁷

Type of Patient Treated

Our interest in extrapleural pneumothorax was stimulated by a hope that something could be done to help certain apparently hopeless and bed-ridden cases who could not be accepted for thoracoplasty. The group under consideration totals 48. An appraisal was first made of what the outlook for each case would have been if bed rest, et cetera, had been continued without any form of surgical treatment. Of the total, 34 were graded as hopeless, 6 as probably hopeless, and 8 were given a guarded prognosis by the medical staff.

As stated in a preliminary report by Tubbs and the author, the factors which contra-indicated thoracoplasty at the time for those patients accepted for extrapleural pneumothorax were as follows:

- 1) Patients with active disease with cavitation, showing extension of an exudative lesion. Most of these patients were in their teens or early twenties, and were running a febrile progressively downhill course. Three years ago thoracoplasty was considered extremely hazardous for such patients. Twenty-six patients, only one of which was unilateral, were in this group.

- 2) Patients with extensive bilateral disease

of a fibrocavernous nature unsuitable for bilateral thoracoplasty or unilateral thoracoplasty because of the extent of the collapse necessary to close cavities in the contralateral lung. Fifteen patients were in this group.

3) Patients with complicating factors, such as asthma, insufficient cardiovascular reserve, generalized emphysema, and so forth. Six patients were in this group.

One patient did not fall strictly within any of the three groups. This patient had scattered disease with small cavities throughout the right lung with a questionably healed left lung. Pneumothorax was impossible on the right side and there was also considerable uncertainty as to how extensive a collapse would be required to control the lesion. An extrapleural pneumothorax was therefore decided upon in the hope that there might later be partial reexpansion.

In view of the fact that 85 per cent of the patients fall in groups one and two, it is apparent that our experience with extrapleural pneumothorax is essentially its application in the control of one or both sides in progressive bilateral disease. Combinations of measures were employed to control the contralateral lung: intrapleural pneumothorax in 19 cases; thoracoplasty in 5 cases; and extrapleural pneumothorax in 3 cases. In 4 patients, extrapleural pneumothorax was carried out on the better side to prepare the patient for subsequent thoracoplasty on the worse side. In 8 instances, extrapleural pneumothorax was used in combination with intrapleural pneumothorax where the apex was broadly adherent. In each case the two spaces were immediately joined at operation to form a common space. In 4 instances an inadequate extrapleural space was enlarged by re-operation. The total number of operations performed upon 48 patients was 55, (3 bilateral, 4 re-operations).

Immediate Results

No immediate fatalities occurred following any of the primary operations. The only operative death in the series took place after a second reoperation for bilateral disease. The patient was Miss A. D., age 28, who had been hospitalized for four years and was rejected on several occasions for surgical treatment of any kind because of severe asthma with emphysematous changes in the lower

lobes and fairly large thin-walled cavities in both upper lobes. She was the first patient whom we treated by extrapleural pneumothorax. The stripping was insufficient on both sides and bilateral re-operation was required. Both the right and left primary procedures and the left re-operation were tolerated well. Following re-operation on the right side, there was evidence of marked pulmonary insufficiency unrelieved by partial withdrawal of air from both spaces and administration of high concentrations of oxygen by tent. Death occurred ten days later.

Complications

The majority of patients passed through the early post-operative period satisfactorily. Variable amounts of fluid appeared in the extrapleural space in the majority of cases and were managed successfully. In one case, blood clots interfered with aspiration of the contents of the space. A trocar was introduced and the space cleansed effectively. In all cases, subcutaneous emphysema was either absent or gave no concern.

Empyema, tuberculous or mixed, was by far the most important complication and occurred in 14 of the 51 spaces created. A broncho-extrapleural fistula was demonstrated in 7 patients and this complication was an important factor in the death of 7 patients. In 4 patients the space was sterilized successfully. Empyema occurred most frequently in patients who were febrile pre-operatively, with serial roentgenograms suggesting an active and advancing process. However, this was not always the case. Half of the spaces became infected from 4 months to over a year after the successful creation of the space and after the space was dry and its maintenance apparently satisfactorily regulated by air refills. After this interval of time, one could also assume that the danger of necrosis of the cavity wall, devascularized as a result of its separation from endothoracic fascia, had passed. Four desperate risk cases with giant ball-valve cavities were accepted with a full appreciation of the danger of separation of such lobes. Empyema resulted in 3 cases, but in 2 of them this complication came late, 3 and 6 months after the space was created. Empyema also developed when least expected. One case in particular was distressing, that of Mr. A. M., age 33, who

had bilateral progressive disease and was in urgent need of collapse. The left upper lobe was excavated. There was a spreading fine infiltration throughout the upper two-thirds of the right lung with adherent pleura. Obviously, a permanent collapse of the left upper lobe was required, but at the time we thought this could be performed more safely if the better lung were first controlled by a more flexible type of collapse. A right extrapleural space was made and maintained for one year, during which time, left selective thoracoplasty was done resulting in sputum conversion. Then the extrapleural space became infected, was sterilized, and converted to oleothorax, with subsequent development of a cutaneous fistula. A two-stage left posterior and anterior thoracoplasty was finally required to obliterate the space. In this case, the better side, which was treated by extrapleural pneumothorax, eventually caused far more trouble than the worse side, where the upper lobe was totally destroyed. Today we would omit extrapleural pneumothorax on the better side, treat the worse side by primary thoracoplasty, and then if the better lung failed to clear, proceed with bilateral thoracoplasty.

In three patients, extension of pre-existing disease followed surgery. In one case there was homolateral extension of the disease; in two cases the spread took place in the contralateral lung. In all three patients, the augmentation of the active pulmonary process was a factor in shortening the anticipated survival period.

An appraisal within the first eight weeks of operation of the benefits derived from extrapleural pneumothorax revealed that:

	No.	%
a) Cavities were apparently closed in	28	55*
b) Sputum was converted in	20	42
c) Condition was temporarily improved in	38	79
d) Benefit was not obtained in	9	19†
e) Condition was made worse** in	5	10†
f) Died	1	2†

* Based on 51 sides, 48 patients

**Four of the 5 had already developed empyema.

† 31% were not helped by the operation.

Considering the status pre-operatively with 80 per cent of the patients considered as

probably hopeless, the results after the first 8 weeks seemed encouraging, with 69 per cent apparently improved.

Late Results

A recent review has been made of the present status of all patients treated, now from one to two and one-half years since operation, with an average period of observation of 21 months. The following data was obtained and pertains to the 47 patients surviving operation:

	No.	%
a) Late deaths (3 to 21 months post-operative)	18	38
b) Living with active disease	9	19
c) Living with inactive disease (Discharged as quiescent—8)	20	43

As pointed out before, the use of extrapleural pneumothorax in this group of patients was from the beginning considered as a step in a program of permanent collapse treatment. There was one possible exception where it was hoped that partial re-expansion might be accomplished. Recent review of living cases has shown that the following disposition has so far been made of the extrapleural space:

	Patients with active disease	Patients with quiescent disease	Total
Maintained	2	12*	14
Oleothorax	5	4	9
Converted to thoracoplasty	2	3	5
Abandoned	2	0	2
	11	19	30*

* One of the three patients treated by bilateral extrapleural pneumothorax is still living with quiescent disease and both spaces are being maintained by air refills. The above figures therefore apply to 29+1=30 sides rather than 29 living patients.

Conversion to extrapleural oleothorax was resorted to: (1) when it became difficult to maintain the collapse at the proper level by air refills; (2) in an attempt to convert positive sputum when this was not accomplished by air refills; and (3) following chemical sterilization of an infected space. Conversion to thoracoplasty has, up to the present time,

been done when infection of the space occurred, complicated by either a bronch-extrapleural fistula, or an extra-pleuro-cutaneous fistula. It should be noted that under these circumstances a complete and satisfactory obliteration of the infected extrapleural space is difficult. We have had no experience in performing thoracoplasty over an air-maintained and uncomplicated space.

Diminishing Field of Usefulness

The fact that extrapleural pneumothorax was used for 44 patients in 1937 and 1938, whereas the number dropped to 4 in 1939 and to 1 in 1940, in a way speaks for itself. The procedure has not been entirely abandoned, but has come to be rarely used. There are a number of explanations for this situation:

1) Many of the patients so treated represented several years' accumulation of complicated bilateral problems, turned down on previous occasions for any type of surgery. During the early years of its use, the number of patients accepted for extrapleural pneumothorax was, therefore, not a true representation of the frequency of application. Of the total number of 48 patients accepted then, we would still elect extrapleural pneumothorax as the procedure of choice for 20 patients.

2) Six patients accepted two and one-half years ago for extrapleural pneumothorax would probably be rejected today for any form of surgery. The acceptance of these patients seemed justifiable in the beginning for the sake of determining to what extent apparently hopeless patients might be salvaged by this method.

3) Today, selective thoracoplasty has been extended to include many of the desperate risk cases formerly treated by extrapleural pneumothorax. Twenty-two of the original group of 48 patients, if their collapse program were being planned today, would be advised to have their more diseased side attacked by primary thoracoplasty. By this is meant not a simple upper costectomy, but a very limited rib removal with extensive mobilization of the lung, freeing entirely the anchorage of the diseased area from the chest wall, vertebrae, and mediastinum as the case may require. Soft parts of the chest wall drop down with the lung. The collateral blood supply derived from the chest wall is not separated from the peripheral portions of lung and a

space is not created between infected lung and chest wall. The patient receives the benefits of a selective apical collapse, which approaches in completeness that obtained in extrapleural pneumothorax, without running the great risk of extrapleural empyema.

Enlarging Field of Usefulness of Thoracoplasty

We became encouraged to extend the benefits of thoracoplasty with specific mobilization to more desperate risk cases after making the following observations:

1) Several patients considered too ill for thoracoplasty were accepted for extrapleural pneumothorax, but due to the finding of excessive thickening and adherence of the layers at operation, stripping was abandoned. Since the upper ribs were exposed, thoracoplasty was done. In these cases the convalescence was uncomplicated and the patients improved sufficiently to make it possible to complete the stages later. These patients, therefore, form as nearly a perfect control group as could possibly be obtained.

2) Experience with specific mobilization of diseased lung supplementary to first stage two and one-half rib thoracoplasty has shown a fairly high incidence of temporary sputum conversion. A study of sputum reports on patients with unilateral cavitation, who were running consistently positive sputa preoperatively, revealed that during the eight week period following such a type of first stage thoracoplasty a surprisingly large per cent became consistently negative.

	No.	%
Total patients	176	100
P. O. sputum consistently positive	46	26
P. O. sputum consistently negative	66	38
P. O. sputum alternated positive and negative	63	36

3) The majority of patients show a marked clinical improvement with a better appetite, and decrease or abolition of cough and expectoration. Progressive weight loss is often checked. If patients were running a febrile course before operation, the temperature frequently drops or becomes normal.

4) Operative mortality of first stage thoracoplasty with lung mobilization in patients

with active bilateral disease, or with severe complications which placed them in the poor risk group, compares favorably with the mortality of extrapleural pneumothorax. In 162 such patients treated by primary thoracoplasty, there have been 5 post-operative deaths following the first stage, a mortality of 3 per cent.

5) Complications which increase late mortality and jeopardize results are less frequent following a non-space producing type of permanent collapse.

a) Empyema occurred in 27 per cent of the spaces created for extrapleural pneumothorax, whereas infection of the apicolytic pocket following thoracoplasty with mobilization occurred in only 4 per cent (7 out of 162 cases) of the bad risk group where the lung was mobilized at the time of the first stage thoracoplasty.

b) Extension of the pulmonary process occurred in 6 per cent of the extrapleural pneumothorax cases, whereas an extension has taken place in 2.2 per cent of the first stage thoracoplasty cases.

These observations have led us to use a limited apical rib removal with specific mobilization of the diseased lung as a primary procedure to turn the tide in many desperate risk cases. The first stage represents, then, a life-saving measure. After maximum improvement has taken place, subsequent stages may frequently be considered as elective for the purpose of rehabilitation.

Sufficient time has not elapsed since primary first stage thoracoplasty with mobilization has been used for certain desperate risk cases in preference to extrapleural pneumothorax, to make it possible to present comparable studies of late results. Such studies, however, will be made and published.

Present Attitude Regarding Extrapleural Pneumothorax

The hope that extrapleural pneumothorax could come to occupy a rather large place on either extremity of the position held by thoracoplasty has not materialized. The method must be considered a permanent form of collapse as clinical evidence of complete and voluntary re-expansion without re-activation of disease is lacking. It must be admitted that the method carries a serious threat of late complications. Therefore, extrapleural

pneumothorax should not be used as a reversible procedure in patients who do not have sufficient involvement to warrant thoracoplasty. Furthermore, its usefulness on the other extremity of thoracoplasty will progressively decrease as it becomes possible to treat successfully an ever-increasing number of bilateral cases by primary thoracoplasty with mobilization.

Personal experience to date, together with reports in the literature, fail to induce us to employ extrapleural pneumothorax for that group of patients designated by Dolley, Jones, and Skillen under "absolute indications." This group includes patients with small, thin-walled cavities, unilaterally situated above the sixth rib posteriorly. The patients must also be fair to good surgical risks. In our opinion patients suffering disease of such a description are ideally treated by thoracoplasty.

Two years ago, Tubbs and I summarized a preliminary report as follows:

Our experience to date has led us to feel that extrapleural pneumothorax will become a well-established form of collapse therapy and a valuable addition to the surgical armamentarium in the treatment of pulmonary tuberculosis. The operation will not supplant upper selective thoracoplasty. Extrapleural pneumothorax will probably find its greatest usefulness in: (1) extensive bilateral disease when selective collapse by intrapleural pneumothorax is impossible; and (2) less extensive but active disease, when collapse therapy is urgently needed but pneumothorax is impossible or unsatisfactory, diaphragmatic paralysis is considered inadequate, and yet thoracoplasty carries too great a risk or is definitely contra-indicated.

Today, this statement should be modified in respect to patients with very active disease. Febrile, toxic patients showing predominantly exudative disease with cavitation are not suitable for extrapleural pneumothorax. If heroic steps are to be taken as a life-saving measure, a limited apical thoracoplasty with mobilization is more likely to turn the tide than extrapleural pneumothorax and is less apt to be accompanied by complications. Stiff-walled and giant cavities can be closed with greater assurance by thoracoplasty than by extrapleural pneumothorax.

This much can be accredited to extrapleural

pneumothorax: The method has the advantage of maintaining the integrity of the costal cage and does not interfere with accessory muscles of respiration. The procedure can be considered for adult forms of tuberculosis in children after intrapleural pneumothorax and phrenic paralysis have failed. For the same reason, extrapleural pneumothorax may also be considered for another numerically unimportant group, i.e., certain patients with asthma or emphysema, providing thoracoplasty is contra-indicated. The method will continue to have its greatest usefulness in a limited number of patients with bilateral disease. These patients, however, must be unsuitable either for bilateral thoracoplasty or for unilateral thoracoplasty combined with some other type of collapse of the contralateral lung.

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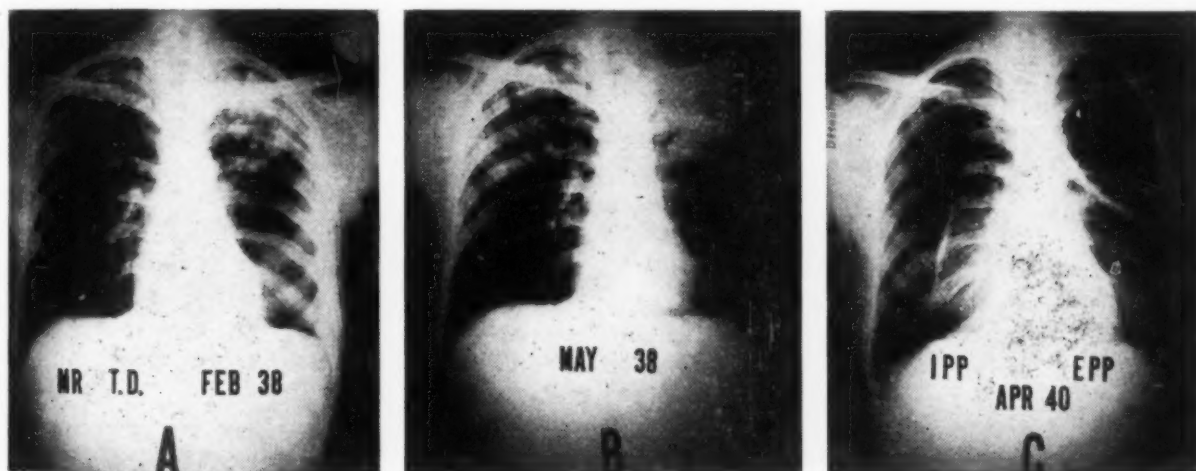


FIGURE I

Mr. T. D. Age 35. Indication for operation—progressive bilateral disease with general condition too poor for thoracoplasty.

A) Admission film. Intrapleural pneumothorax impossible on left side.

B) Three months later after strict bed rest in sanatorium, there was progression of lesion in right lung. Patient still too ill for thoracoplasty.

C) Film two years after extrapleural pneumothorax was used to control the most extensive lesion. Intrapleural pneumothorax was initiated on the right side one month after extrapleural space was created on the left side. Sputum was converted and has remained consistently negative for over two years. The patient is symptom free. Left conversion thoracoplasty is being considered.

Illustrations continued on next page

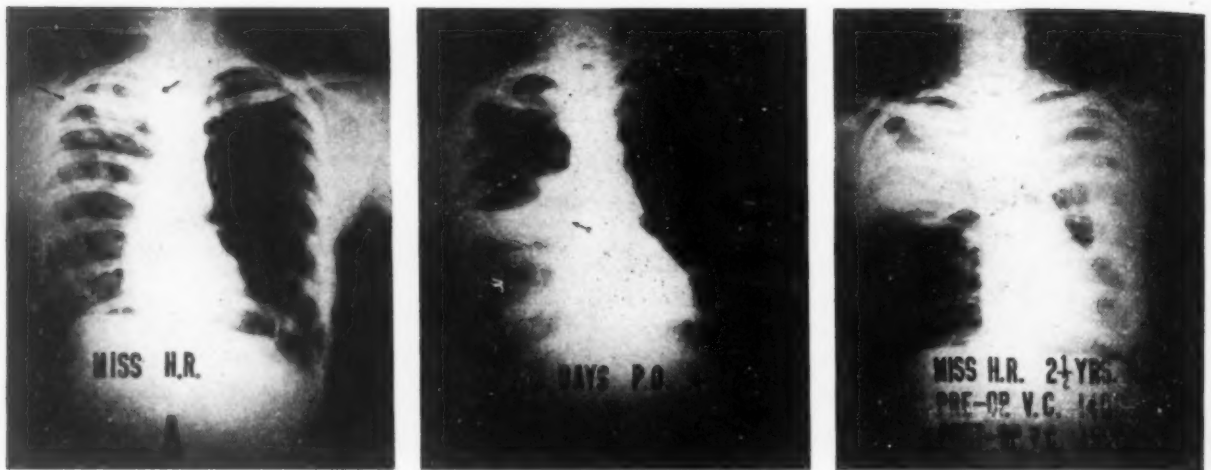


FIGURE II

Miss H. R. Age 26. Indication for operation—bilateral disease with inability to re-expand the better lung (left) adequately, and extensive collapse on right required. Patient had been ill 6 years, the latter 3 of which were spent in a sanatorium. At no time was she considered suitable for thoracoplasty on account of poor general condition.

- A) Pre-operative film showing extent of disease on right side.
- B) After extrapleural space was created.
- C) After conversion to right extrapleural oleothorax and left intrapleural oleothorax.

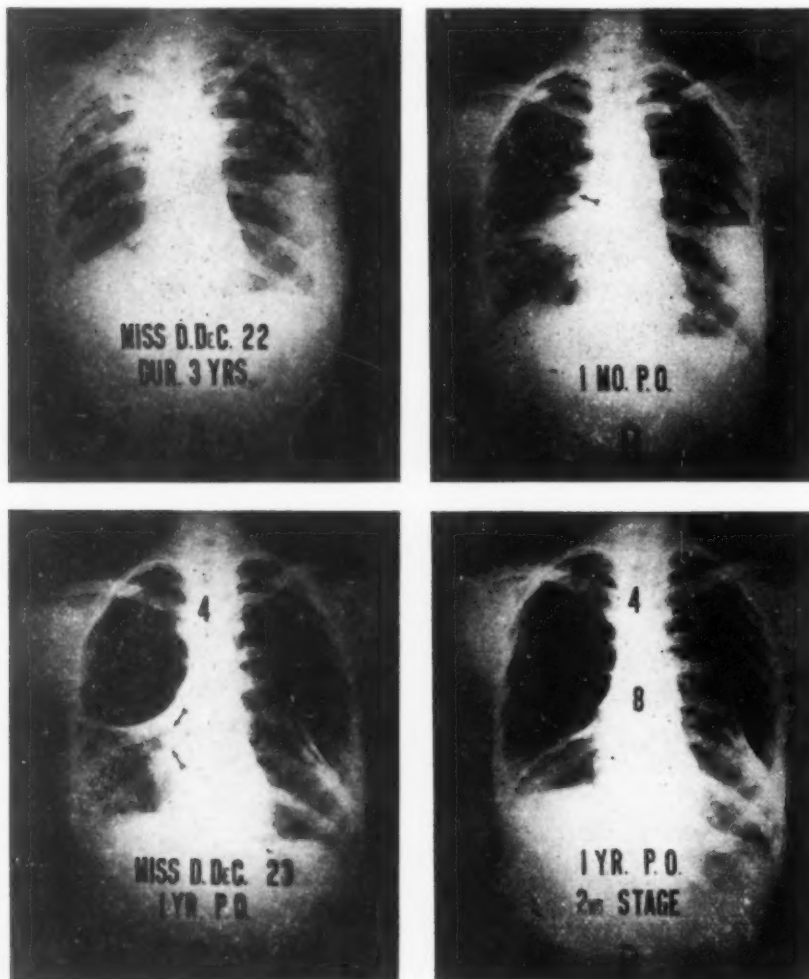


FIGURE III

Miss D. DeC. Age 22. Indication for operation—bilateral disease with right intrapleural pneumothorax impossible and the disease too extensive to control with thoracoplasty. Poor general condition of the patient also rendered her unsuitable for thoracoplasty. Duration of pre-operative hospitalization—3 years.

A) Pre-operative roentgenogram—January, 1938.

B) Post-operative roentgenogram one month later showing adequate extrapleural space but persistent cavity in upper lobe. This was closed within two months, and sputum remained negative for 9 months.

C) One year after operation showing new cavity below extrapleural space, apparently in apex of lower lobe. Re-operation was then performed, stripping the lung to the eighth interspace posteriorly. The sputum was not converted, however, until after a right temporary phrenic paralysis was induced.

D) Post-operative roentgenogram one year after re-operation and two years after original operation. The patient is improved but is still in the sanatorium and sputum is occasionally positive.

FIGURE IV

Diagrams of sagittal plane of chest illustrating extent of separation required if extrapleural pneumothorax is to be effective. Numbers represent arbitrary pulmonary segments.

A) Diagram showing cavitation postero-superior segment. This is by far the most common site for cavity in adult type of tuberculosis.

B) Incomplete separation of upper lobe. Extrapleural space inadequate. Such a limited collapse will fail to effect cavity closure.

C) More selective stripping of lung resulting in a posterior pocket obliquely placed. Likelihood of immediate cavity closure greater than in B. Space is difficult to maintain as air pocket does not completely cap the upper lobe. Re-elevation of the apex and reopening of the cavity is almost a certainty.

D) Satisfactory extrapleural space which has been extended well below lowermost limit of disease and has horizontal base. Maintenance by air refills less difficult than in B or C.

E) Satisfactory extrapleural space which has been filled with oil.

F) Chest wall moved in after selective mobilization of diseased segment. Such a thoracoplasty may conserve more healthy lung than an extrapleural pneumonolysis for it does not necessitate the loss of the anterior portion of the upper lobe.

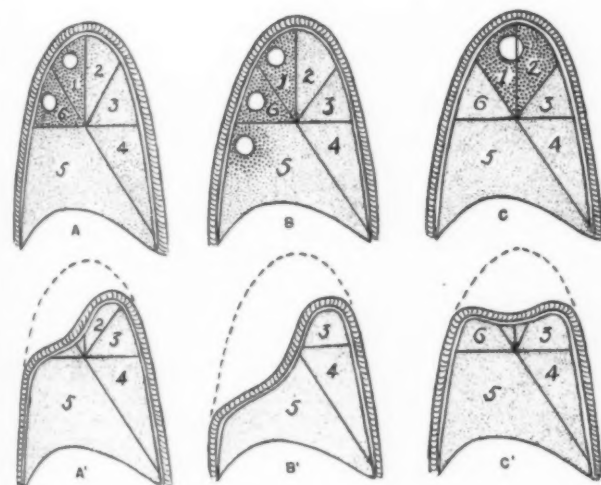
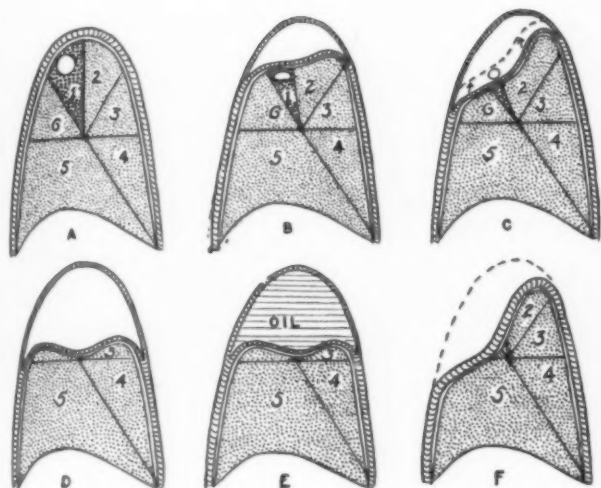


FIGURE V

Diagrams of a sagittal plane of chest illustrating adaptability of selective thoracoplasty to extent and distribution of areas of cavitation.

A) Frequent location of cavitation in posterior portion of upper lobe and apex of lower lobe.

A1) Thoracoplasty designed to collapse posterior segments without interfering with function of uninvolved segments.

B) More extensive involvement of upper and lower lobes but still limited to posterior half of thorax.

B1) More extensive posterior thoracoplasty.

C) Extensive upper lobe involvement with giant cavity.

C1) Thoracoplasty essentially limited to upper lobe area with conservation of lower lobe.

Important Notice

The following resolutions were passed by the Board of Regents of the American College of Chest Physicians:

1. RESOLVED: that after January 1st, 1942, the initiation fee of the American College of Chest Physicians will be one hundred (\$100.00) dollars.

2. RESOLVED: that the Board of Regents of the American College of Chest Physicians, by authority of Article II, Section 4, of the By-Laws, will set up an Examination Com-

mittee for the examination of all applicants for Fellowship in the American College of Chest Physicians, the examinations to be held for all physicians applying for Fellowship after June 15th, 1941, excepting in cases of physicians exempted by a vote of three-quarters of the Board of Regents.

3. RESOLVED: that initiation fees shall be waived for all applicants for Fellowship in the American College of Chest Physicians, who are on active duty as Commissioned Officers of the Army, Navy, or Marine Corps.

The Physical Examination in Pulmonary Tuberculosis

CHAMP H. HOLMES, M.D., F.A.C.P., F.A.C.C.P.
Atlanta, Georgia

It is common knowledge that in recent years, the importance of the physical examination as a diagnostic procedure in pulmonary tuberculosis has been somewhat relegated to the background and is being replaced by the more scientific methods of precision. This is to be regretted because it is keenly sensed that a very vital something in the art of medicine is slipping from our grasp. However, in spite of this dethronement, the physical examination still has a contributing place in the scheme of things—and an important place. Just how and where these contributions are made, will comprise the contents of this presentation. Rather than quote passages from the many available text books—a temptation indeed in writing upon this subject—I am, instead, drawing upon personal experiences as my source. I trust the personal touch will compensate for any loss of factual standardization.

A general physical examination gives us a comprehensive assay of the habitat of the disease with which we have to reckon. This is extremely important. The diseased lungs are not to be considered as an entity, as something apart, but must be evaluated and judged as an integral part of the whole. Any deviation from this fundamental will invite grievous errors in judgment, therapeutic formulation and prognosis. The age, degree of nutrition, emotional and anxiety states, cyanosis, the frequency and character of the cough, dyspnoea, the status of the cardio-circulatory system—and many other such observations; are physical data of the first magnitude—particularly when contemplating formidable collapse procedures. The weakened, frail, disease-ravished body calls for an entirely different order of things than does the apparently normal, rugged, resisting organism. The absence or presence of other abnormal disorders or physical impairments, can and does largely affect, influence and govern the course and future of an individual's destiny. As an example of this latter I want to cite briefly the following case.

A man in his middle forties had a unilateral,

advanced tuberculosis with cavity formation. From the narrowed vision of a lung study, he was an ideal case for thoracoplasty. The obvious presence, however, of a carcinomatous lesion of his mandible with apparent bony metastases at once made it clear that the contemplation of any collapse therapy was futile.

The physical examination of the chest itself may be, and frequently is, of great value in arriving at correct diagnostic conclusions and in furthering proper case planning. The first consideration in the chest examination should be that of its performance. With your indulgence I wish to emphasize a few of the essentials pertinent to this performance.

A proper exposure of the chest in a good light is essential. With tact on the part of both physician and attendant, an opposing modesty may be readily overcome. An attempt to examine the chest through the clothing may be forthwith ranked as heresy. It is likewise essential that the examination be conducted in an environment free from extraneous sounds or noises. A passing vehicle, the low murmur of voices in the room, the hum of a fan, and even the trickling of water from a dripping faucet may prove very distracting; or even preclude a satisfactory examination. For doctors in office buildings, who engage in any considerable amount of chest work, an inside examining room is highly recommended. Making provision for the physical comfort of both patient and physician during the examination is conducive to satisfaction and provocative of efficiency. In my opinion, a thing of tantamount importance in performing a proper physical examination of the chest, is concentration. A lack of concentration is the "looking up in golf." A satisfactory examination can not be made while thinking of your fishing trip that afternoon, the bridge hand last night, or perhaps some other sick patient in your practice. Again, I emphatically repeat: Concentrate! Feel, what you touch; hear, to what you listen, and see, at what you look.

I find it a very helpful practice to quickly go over the whole chest at the beginning, and to follow this with a narrowed attention to some particular area. The orientation of the heart and mediastinum before making a meticulous investigation of the lungs also frequently serves me well. Hovering over some given area for too long a time frequently invokes confusion and a loss of perspective. The patient may tire or become irritable under these circumstances. Beginning at the bottom of the chest and working upward is favored by a few, but the more orthodox downward procedure is the rule, and the one I usually follow. The axillary area is an important one and should never be neglected.

Using the best of technique, the percentage of error in diagnosing positive cases of pulmonary tuberculosis by the physical examination alone is considerable. With sloppy or careless technique, it must be appalling. The best, therefore, is none too good for our purpose. A light, precise percussion stroke is preferable to a heavy sluggish one. The percussion note should be felt as well as heard. This fact accounts for a deaf person performing creditable percussion. The most significant physical finding in pulmonary tuberculosis is the detection of persistent rales in the upper lung zones. These are best heard, and very frequently heard only, after the expiratory cough. A quick tour of the chest surface, using this expiratory cough, alone constitutes a fairly comprehensive survey. The whispered voice is a very helpful means for finding small localized areas of consolidation. The wooden, resisting, flat-

ness of the percussion note is extremely characteristic of fluid; and is encountered in very few other conditions. Supplemented by organ displacement and the presence of a para-vertebral area of dullness on the opposite side—Grocco's sign—we have a method of utmost value in differentiating fluid from thickened pleura, fibrosis, consolidation, etc. A practical point to remember in performing exploratory thoracentesis for known or suspected fluid, is to make the point of puncture over a flat area. Otherwise, only a few c.c. or a "dry tap" will reward your efforts.

The scope of this paper should include, but its length does preclude, a further detailed discussion of the several procedures of the physical examination and the many important findings to be obtained therefrom. Perhaps those who discuss it will make these additions, or enlarge upon some of the features that I can only mention, such as: curvature of the nails, uni-lateral or bilateral signs, character of the dyspnoea, appearance and movement of the chest wall, cavity signs, localized wheezing, changes in the breath sounds, etc., etc.

To have had extensive experience and expert training in the larger clinics, has not been the fortune of all of us; to be endowed with that inherent ability that is possessed by some physicians, is the heritage of only a few of us; but the observation of a few basic principles is to be had by each and all of us. To this latter is the message of this paper dedicated.

478 Peachtree St., N. E.

Book Reviews

ARTIFICIAL PNEUMOTHORAX IN THE TREATMENT OF PULMONARY TUBERCULOSIS, a Sound Film written by Doctors James S. Edlin, Sydney Bassin and Walter Lichtenberg. Produced by Capitol Films, 11 West 42nd Street, New York City. Showing time: 30 minutes. Sale price: \$90.00 per print; Rental price: \$15.00 per booking. Reviewed at the University of Illinois College of Medicine, January 20, 1941.

From the moment that Dr. Kendall Emerson started his introduction to this film until the final page of conclusions was projected on the screen, intense interest was manifested by both the student body and graduates viewing it. The preparation of the material has been so carefully made and it so clearly ex-

hibits those facts which are essential in portraying the problems engendered in pneumothorax, that one can only appreciate the great clarity of the problem as it is envisioned on the screen. The speaker, who discusses the film as it runs, has evidently been trained not only in teaching, but in exact definition and intonation.

The camera and art work and the schematic drawings, as well as the portrayal of roentgen films and the fluoroscopic viewings of the chest, showing the heart and lungs in motion as they function, are in the clearest possible

delineation. Commencing with a brief description of the importance of rest in the management of pulmonary tuberculosis, a description of collapse therapy is given. Roentgen films depicting various types of pulmonary pathology in the tuberculosis classification are presented and complications to such pathology noted.

The indications for artificial pneumothorax are thus shown and, finally, the technique is given, both in detail on the patient and schematically, so that there can be no doubt as to the apparatus, procedure, and the changes induced in the patient. Initial induction is demonstrated; refills showing the importance of the fluoroscopic check-up before and after are noted; the complications, such as adhesions, air embolism, and development and management of fluids, and spontaneous pneumothorax and its management are thoroughly covered. Pulmonary hemorrhage in the pathologic specimen is shown schematically and on roentgen films; and an explanation of the importance of adjunct procedures, such as intrapleural pneumolysis and thoracoplasty is given. Finally, the problem of re-expansion of the lung, with the necessary observations on how to determine the possibility of cavity reexpansion before complete reexpansion of the lung has occurred is covered. Bilateral artificial pneumothorax is also pic-

tured.

I have never seen a film which solved to better advantage a teaching problem. A change which should be made and which would add to the teaching benefits of the film, would be to arrange, in tabulated form, lists of indications, contraindications, complications, and sequella, so that students and practitioners, who have only a very limited knowledge of the procedures would have pictured in their minds a compilation of these various important details, or would be able to make notations of them.

I can recommend the use of this film in medical schools and before practitioners everywhere. It is one of the best methods yet devised for extending knowledge concerning artificial pneumothorax.

BENJAMIN GOLDBERG, M.D.

Chicago, Illinois

"SYNOPSIS OF PULMONARY TUBERCULOSIS"

by Jacob Segal, M.D., F.A.C.C.P.,
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F. W. B.

Organization News

SECTIONAL MEETING OF THE AMERICAN COLLEGE OF CHEST PHYSICIANS

On Friday, March 14, there will be held at Sea View Hospital, Staten Island, New York, a sectional meeting of the American College of Chest Physicians for the states of New York, Pennsylvania, New Jersey, Delaware, West Virginia and the District of Columbia. Members of the American College of Physicians, the American College of Surgeons and the Association for Thoracic Surgeons, in these states are being invited to attend. The program, as follows, will be based on the clinical work being done at the 2,000 bed thoracic hospital which is the meeting place:

9:00-10:30 Intra-cavitary Drainage: Discussion, Demonstration. Dr. Davidson and Staff.

10:30-12:00 Serial Section Radiography: Demonstration of Methods and Results. Dr. Shapiro and Staff.

12:00- 1:30 Luncheon. Round Table Discussion.

1:30- 2:30 Pathology Conference.

2:30-4:30 Empyema Conference. Drs. Auerbach, Davidson, Ornstein, Petroff.

Dr. David Ulmar, 150 West 52nd Street, New York City, a member of the Committee for Advancement of Scientific Programs of the American College of Chest Physicians, is in charge of the program and anyone interested in attending should communicate with him promptly. Dr. Ulmar has asked that physicians who plan on attending the meeting and who have a problem they would like discussed or presented, contact him; whereupon, every effort will be made to see that the topic is included in the program.

**DR. PAUL H. RINGER ELECTED
PRESIDENT, SOUTHERN MEDICAL
ASSOCIATION**

Dr. Paul H. Ringer, Asheville, North Carolina; Regent of the American College of Chest Physicians, was elected president of the Southern Medical Association.

APPOINTED ASSOCIATE EDITOR

Frank Walton Burge, M.D., Philadelphia, Pa.; Chairman of the Board of Regents of the College was appointed Associate Editor for Tuberculosis of the Weekly Roster and Medical Digest, the official organ of the Philadelphia County Medical Society. The appointment became effective January 29, 1941.



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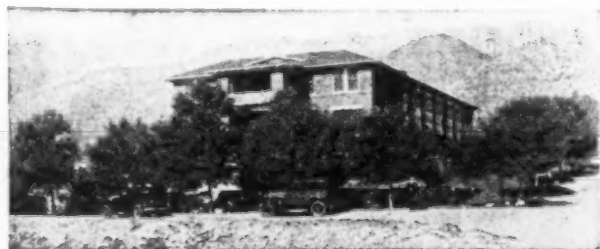
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INAUGURATION OF THE CUBAN CHAPTER OF THE AMERICAN COLLEGE OF CHEST PHYSICIANS



Back row, left to right: Dr. Eduardo Rivero, Dr. Humberto G. Machado, Dr. J. M. Moscoso, Dr. E. Dominguez Mahoney, Dr. J. Gurri Aguilera, Dr. R. Sanchez Acosta, Dr. R. Garcia Mendoza, Dr. J. Garcia Arrazuria, Dr. Jose F. Quiñones, Dr. Francisco J. Menendez, Dr. Atilano Infante.

Front row, left to right: Dr. Carlos Varela, Dr. Antonio Navarrete, Dr. Alfredo Antonetti, Dr. Frank Walton Burge, Dr. Juan J. Castillo, Dr. O. Cabrera Macias, Dr. Joaquin Martos.

The Cuban Chapter of the American College of Chest Physicians organized at Havana, Cuba, on December 24, 1940; is the first Chapter of the College to be organized in Latin America.

The organization of this Chapter has been largely due to the excellent work done in Cuba by the former Governor of the College in that country, Dr. Antonio Navarrete of Havana. Dr. Navarrete has now been elevated to the office of Regent in the College and through this new office, he will be in a better position to extend his influence into other Latin American Countries and assist the chest specialists of those countries in establishing similar Chapters of the American College of Chest Physicians.

Doctor Octavio Rivera Portages, Havana, was appointed Governor of the College to succeed Dr. Navarrete.

Several of our neighboring countries have expressed a desire to form Chapters of the College and the National Offices of the College together with the Board of Regents of the College are lending every assistance to those countries toward establishing such Chapters.

When duly organized, Chapters of the College are granted charters by the Board of Regents of the American College of Chest Physicians, which makes them an official organization of the College.

Special dispensation has been enacted by the Board of Regents of the College to relieve the financial strain on the Fellows and Associates of the College from foreign countries. The following resolutions were voted upon by the Board of Regents of the College and passed:

1. **RESOLVED:** that the American College of Chest Physicians accepts the policy of avoiding profit to the organization or to the United States of monies derived from foreign countries in which there are Chapters of the College.

2. **RESOLVED:** that the College set up a separate fund containing all of the money paid into the College by members of a Foreign Chapter in the College, excepting twenty per cent (20%) of the initiation fee and dues which shall be retained by the College as part of the general expenses of the organization,

(Continued to page 94)

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BIO

(Continued from page 92)

and the subscription price of the Journal, the remaining part of the initiation fee and dues to be kept in the separate account, to be used for whatever project is deemed advisable by the governing body of the Foreign Chapter, subject to the approval of the Board of Regents of the College.

3. **RESOLVED:** that the Board of Regents delegate to the Chairman of the Board of Regents the authority to make decisions for the Board of Regents concerning the approval of the expenditure of funds contributed by the Foreign Chapters, providing the amount is less than two hundred (\$200.00) dollars.

The above resolutions are to become effective on and after January 1, 1941.

Dr. Frank Walton Burge, Philadelphia, Chairman of the Board of Regents of the College was the guest of honor at the organization meeting of the Cuban Chapter of the American College of Chest Physicians.

OFFICERS OF CUBAN CHAPTER

The following are the duly elected officers of the Cuban Chapter of the American College of Chest Physicians: President, Dr. Gustavo Aldereguia; Vice-President, Dr. Octavio Rivero; Secretary, Dr. Francisco J. Menendez.

GENERAL CHAIRMAN OF CLEVELAND MEETING REPORTS

Dr. Joseph Placak, General Chairman for the arrangements of the coming meeting at Cleveland, May 30 - June 2, 1941, Statler Hotel, reports that the various committees entrusted with the conduct of the meeting have been completed.

From Dr. Benjamin Goldberg, President-Elect of the College and Chairman of the Committee on Scientific Programs comes the following note:

Among the outstanding men who are to appear on the scientific program for the Cleveland meeting are the following:

Dr. Louis I. Dublin, Vice-President and Statistician for the Metropolitan Insurance Company, former President of the American Public Health Association. His title, "Tuberculosis in the Next Decade, a Prediction."

Dr. Ralph C. Matson, Professor of Surgery, University of Oregon, College of Medicine, "A New Extrapleural Pack in the Treatment of Pulmonary Tuberculosis."

Dr. Frederick H. Falls, President of the American Gynecologic Society, Professor and Head of the Department of Obstetrics and Gynecology, University of Illinois, "Pregnancy and Tuberculosis."

Dr. George G. Ornstein, Associate Professor of Medicine, College of Physicians and Surgeons, Columbia University, Medical Director of Sea View Hospital, "The Clinical Aspects of Cancer of the Lungs."

Dr. Herman L. Kretschmer, President of the American Board of Urology, Professor of Urology, Rush Medical College, "Tuberculosis of the Genitourinary Tract."

Dr. Ralph R. Mellon, Director of the Institute of Pathology, Western Pennsylvania Hospital, "Some of the Newer Concepts of the Tubercle Bacillus and Its Chemical Susceptibilities."

Dr. Edward Kupka, "Monaldi Cavity Aspiration—a Progress Note," Olive View Sanatorium, Olive View, California.

Dr. Chevalier L. Jackson, Professor of Bronchoesophagology, Temple University, School of Medicine, Philadelphia, Pennsylvania, "Differential Diagnosis of Bronchial Obstruction Producing Atelectasis."

Dr. Willard Van Hazel, Associate Professor of Thoracic Surgery, University of Illinois, College of Medicine, "The Present Day Treatment of Empyema, a Report of over 500 Cases."

Dr. Jerome L. Leon, Deputy Medical Superintendent, Sea View Hospital, New York City, in collaboration with Doctors H. Green and C. A. Serbst on the "Visualization of Cavities in Post-Thoracoplasty Lungs."

Dr. Alvis E. Greer, Houston, Texas, "A Study of the Coexistence of Fungus Infections with Pulmonary Tuberculosis."

Dr. William Ogden, Toronto, Canada, "Foreseeing and Forestalling the Disease Tuberculosis."

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(Continued to page 96)

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(Continued from page 94)

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 Dr. J. Winthrop Peabody, Washington, D. C.
 Dr. Paul H. Holinger, Chicago, Illinois

(Continued from page 69)

ployees; waiters and all other food handlers; elevator operators, slum dwellers, house servants, hotel employees, street car and bus conductors (how they do spit on their fingers to separate your exchange ticket from the pack before handing it to you!); and many others.

The editor requests that every one of our Fellows whose State has Senators or Representatives on the Appropriations Committees, that they write to their Senators and Representatives and lay this matter before them, either in their own way or by giving them a copy of this editorial, or both. If our beloved leaders know the unselfish opinion of the leading tuberculosis specialists of their home States, they will be interested and we know they will want to do right by our revered ones. We also want more than anything else, to safeguard our President and his family, and we want our National Capitol to be an example to the World, and not, as a beloved physician in Philadelphia, now deceased, once said of a fine hospital, which at that time had a set of decrepit tuberculosis buildings: "Be like a Well Dressed Man with a Running Sore."

Members of Senate Appropriations Com-

mittee for the District of Columbia:

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F. W. B.



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